MANUAL P-17453

INSULATION RESISTANCE TESTS with MEG-CHEK® Model 2001

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MEG-CHEK® Model 2001 Insulation Resistance Tester

0-100 Megohms, 500 VDC

General Specifications:

Instrument is self-powered—furnished with three type E91 1.5V Alkaline Cells installed (also operates on regular AA penlite cells). Recessed meter is rugged taut-band type with center scale approximately 3.5 megohms.

Aluminum case and panel interlock; case finished in baked grey enamel, panel in baked blue enamel. Instrument furnished complete with two 5-ft. (1.5 m) test leads, instruction manual and compact leatherette carrying case (6¼" x 4⅜" x 3⅜") (15.9 x 11.1 x 7.3 cm). Instrument is 5¾" x 3 7/16" x 2⅞" (14.6 x 8.7 x 7.3 cm). Weight: 17 oz. (482 g). Total weight (instrument, leads, manual, case): 1.5 lbs. (680 g).

MEG-CHEK
OPERATING INSTRUCTIONS

Caution: Make sure all power has been disconnected from equipment before attempting an insulation resistance test.

1. Remove the test leads from the carrying case. Plug the red test lead into the red HIGH VOLTAGE jack and the black test lead into the black GROUND jack.

2. Connect the clips of the two test leads together.

3. Press the PUSH TO TEST button and rotate the ZERO ADJ. control knob until the MEGOHMMETER pointer indicates zero (0).
(When it becomes impossible to adjust the meter to zero, the batteries have become discharged and must be replaced).

4. Release the PUSH TO TEST button and unclip the test lead clips.

5. Connect the test leads across the insulation to be checked.

6. Press the PUSH TO TEST button. The insulation resistance will be indicated on the MEGOHMMETER scale. If the item under test is capacitive allow the meter to stabilize before taking a final reading.

CAUTION

Whenever you handle the MEG-CHEK — or allow others to use it — remember that there is a high voltage across the terminals when testing. Very low current flow makes the MEG-CHEK relatively safe, even when improperly used; but it is best to be sure no one will inadvertently come in contact with test circuit.

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WHY INSULATION RESISTANCE TESTING IS IMPORTANT

Insulation covering the various pieces of electrical equipment and wiring in your plant or product is, to the eye, inert. Its dielectric properties (resistance to electrical flow) are the reason for its use; and since good dielectric materials are also generally good wearing materials, the problem of weakening or faulty insulation resistance may easily be disregarded until valuable equipment or critical wiring systems fail in use.

WHAT IS "GOOD" INSULATION RESISTANCE?

Safe insulation resistance in rotating machinery or other equipment may be regarded as that which is high enough to permit the equipment to operate normally . . . without excessive current consumption or heating. This is the simplest, most obvious rule to follow if you do not care to go into the formulas which may be applied to electrical apparatus to get a close approximation of what the insulation should be for safe operation. Generally, you can consider any insulation satisfactory in industrial equipment and circuits operating at 1,000 volts or less if its resistance exceeds one megohm at normal operating temperatures and humidities.

THE ONE MEGOHM PER 1,000 VOLTS RULE

Carrying the safe minimum of one megohm per 1,000 volts a bit further, you can figure safe minimums for apparatus operating in excess of 1,000 volts by simply adding one megohm to the safe minimum for every 1,000 volts or fraction thereof. For example, if you have equipment operating at 2,500 volts, 2.5 to 3.0 megohms minimum resistance readings should be satisfactory. If your initial insulation resistance readings fall below this "rule-of-thumb" minimum, equipment should be taken out of service, inspected carefully, and necessary cleaning or repairs made to bring resistance values over the minimum reading required.

TESTING SPECIFIC EQUIPMENT

Wiring

Testing wiring can be done on all types of systems, but be sure the wiring is de-energized.

Where you have a distribution panel, you can check the whole system to ground by attaching one MEG-CHEK lead to the dead post of the open main power switch; and the other lead to grounded conduit. Figure 1.

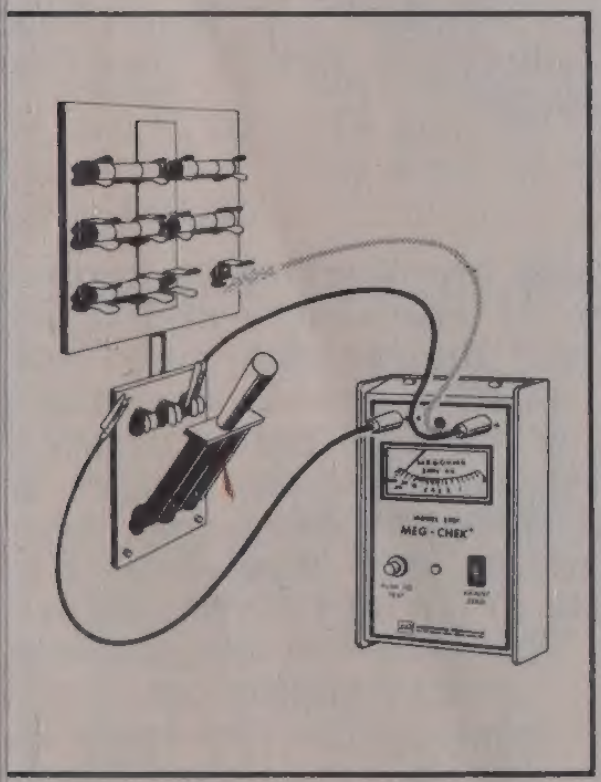


Figure 1. A distribution panel and its individual circuits

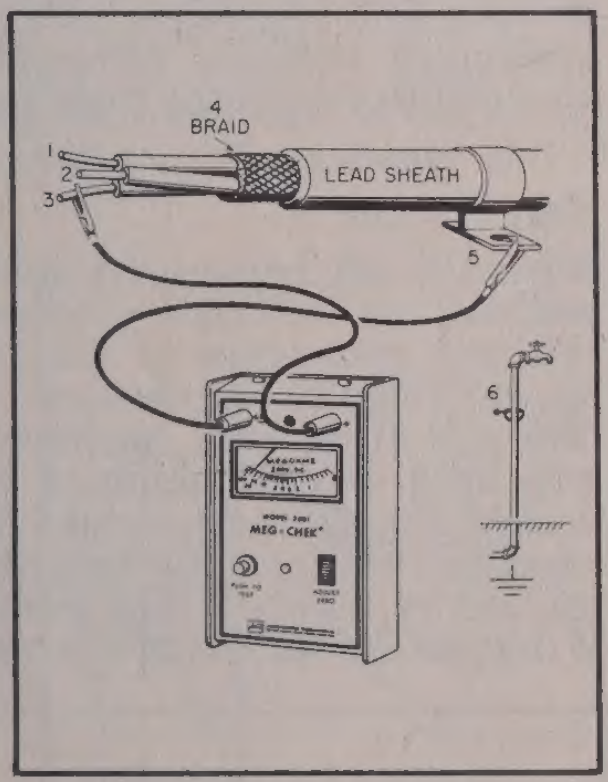


Figure 2. Multiple conductor cables

Individual circuits are tested to ground by opening distribution panel switches or fuses and testing each circuit in turn (Figure 1 shaded lead).

Multi-conductor cables may be tested in any of the ways shown in Figure 2. The drawing depicts the measurement of insulation resistance between wire (3) and lead sheath (5). Various other measurements can be made such as wire to ground (1, 2 and/or 3 to 6), wire to wire (1, 2 or 3 to any combination of each other), wire to braid (1, 2 or 3 to 4), wire to sheath (1, 2 and/or 3 to 5).

Meters

When testing insulation resistance of meter movements and cases to ground, disconnect leads to meter and connect MEG-CHEK positive lead to both terminals of the meter; having negative MEG-CHEK lead connected to a suitable ground.

Meter movements themselves are generally so delicate that if you suspect leakage between elements in the meter, it is best to remove the meter and have it checked by an instrument repair expert.

Watthour meter connections to terminal boxes should be checked from each terminal to ground after opening power circuits and removing meter from terminal box. Insulation resistance between terminal connections should then be checked to determine possible leakage.

Appliances

Virtually all home-used appliances are operated by people without an intimate knowledge of electricity—and often without awareness of the extreme danger they may risk through faulty appliances . . . whether the danger arises through their own negligence, or through manufacturing practices. Meg-Cheking of all appliances at the factory is one of the most important single precautions against merchandise returns due to unit failures, and home accidents caused by short circuits, burn-outs, or circuit failures. Figure 3 depicts the testing of a toaster. This same test can be made to other appliances by arranging the test leads in similar manner. Such testing, where used in final inspection of various common household appliances, have already shown up thousands of faulty units which might have caused lawsuits, or death, had they been allowed to reach consumer markets.

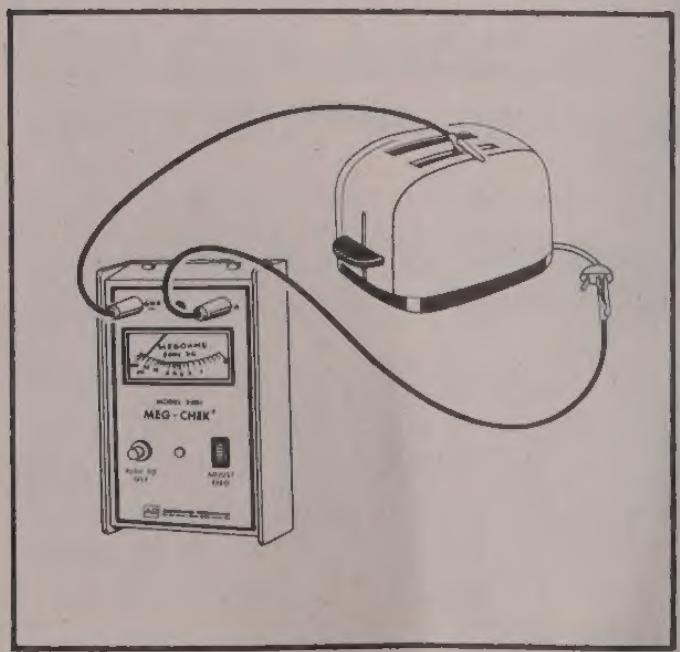


Figure 3. Testing appliances

D.C. Motors and Generators

Disconnect the unit from its power source or line load and attach the negative terminal of the MEG-CHEK to the motor ground, with the positive terminal connected to the brush rigging. This test gives the overall resistance of all components of the unit. To read the resistance of the insulation of the field, either remove the brushes or lift them free of the commutator ring and support them by means of a suitable insulator. With the brushes lifted free of the commutator ring, connection of the MEG-CHEK leads to ground and to one of the brushes will give the resistance of the field alone (see Figure 4). With the brushes still removed from the commutator ring, connection of one of the MEG-CHEK leads to one of the segments of the commutator and the other to ground of motor frame will give the insulation resistance of the armature alone. This may be repeated for all segments of the commutator.

Figure 4. Testing direct current motors and generators

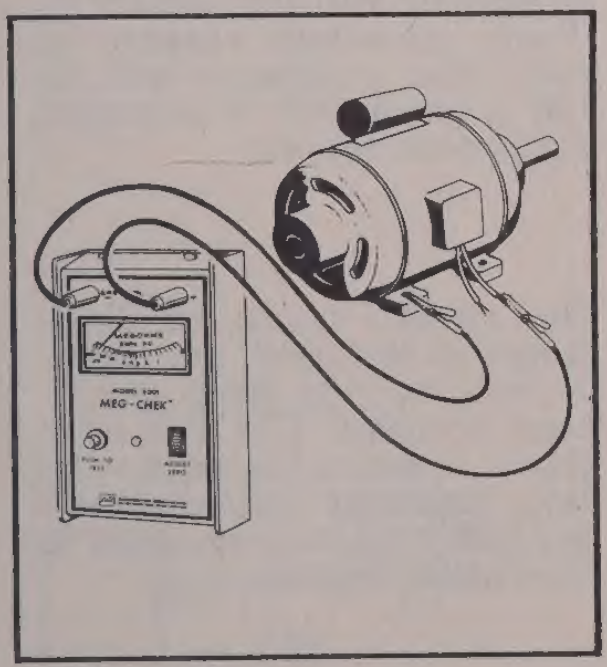


Figure 5. Testing alternating current motors

A.C. Motors

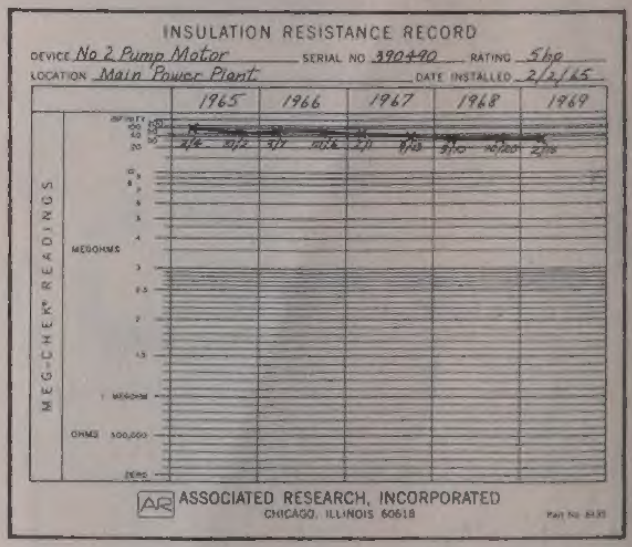
First disconnect the motor from the line, either by use of the switch or by disconnecting the wiring at the motor terminals. If the switch is used, remember that the insulation resistance of the connecting wire, switch panel and contacts will also

be read at the same time. Best test is to connect the positive MEG-CHEK lead to the motor line, and the negative lead to the frame of the motor. (See Figure 5) . . . If insulation resistance minimums have been established, your reading may be checked against them.

Predict motor failure with periodic insulation resistance tests

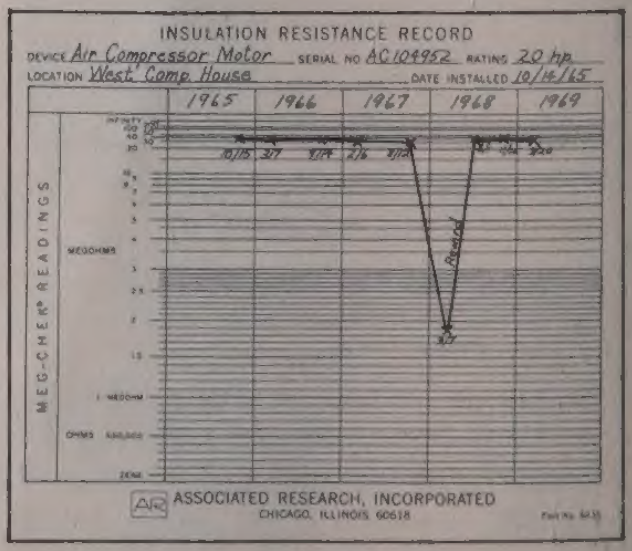
Two motors of the same make, horse power and age may have substantially different insulation values, yet both be in safe operating condition. Of very great importance in preventive maintenance is the change in resistance, particularly an accelerated decrease in insulation resistance.

A simple system of record keeping for each piece of equipment will graphically indicate important changes in insulation resistance and allow a prediction of potential equipment failure.



Our record cards, as illustrated at the right, are a convenient way to keep insulation records. The top card shows a normal aging insulation. Readings plotted show a gradual expected decrease in insulation resistance.

In contrast, the record card below shows a sharp drop in insulation resistance—a warning that insulation is about to fail. Inspection showed a need for new stator windings which were installed during scheduled down time before the unit shorted out under load.

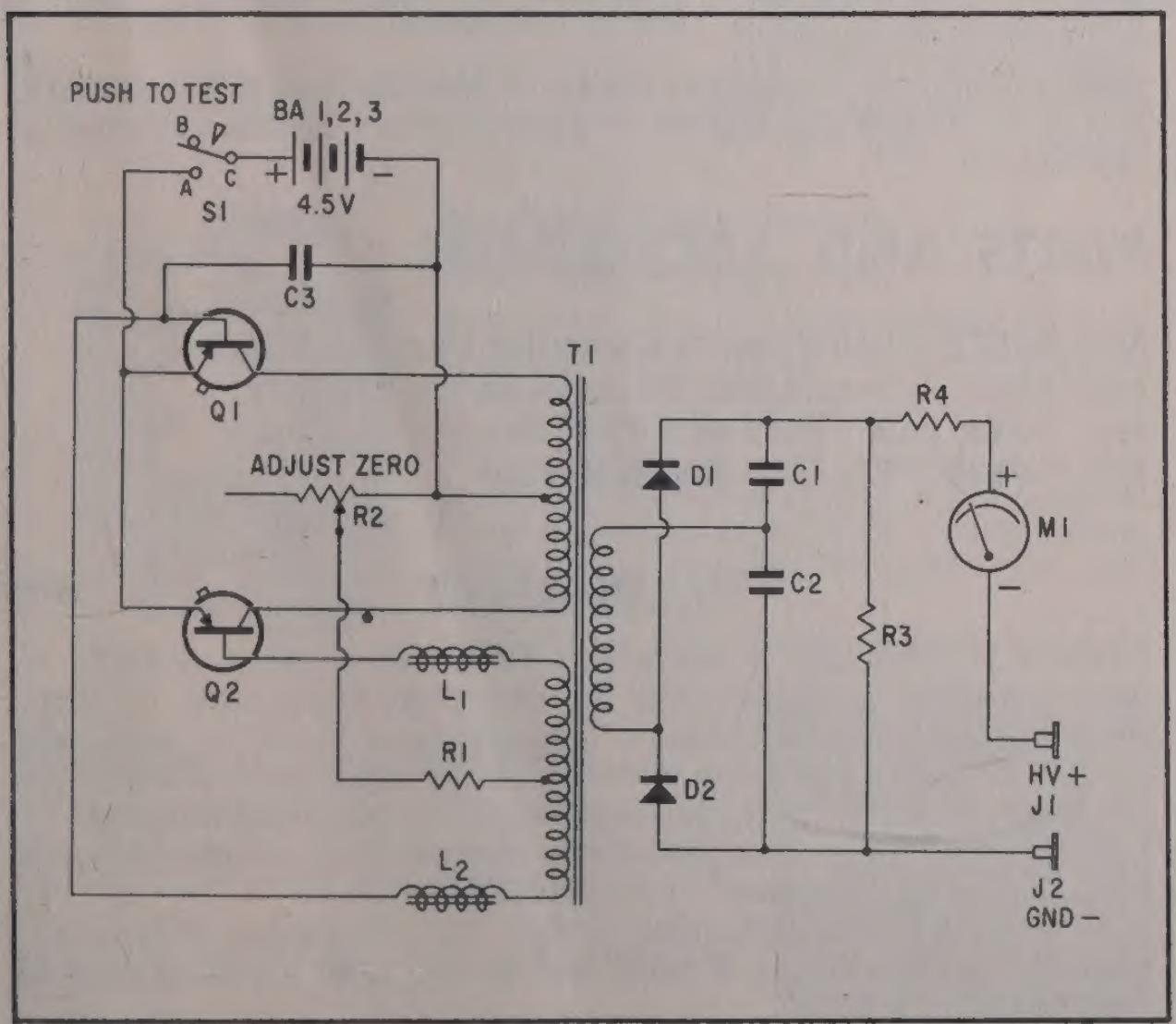


HOW THE MEG-CHEK OPERATES

The megohm range of the MEG-CHEK gives a direct reading of the millions of ohms of resistance which any electrical insulation offers to the passage of current.

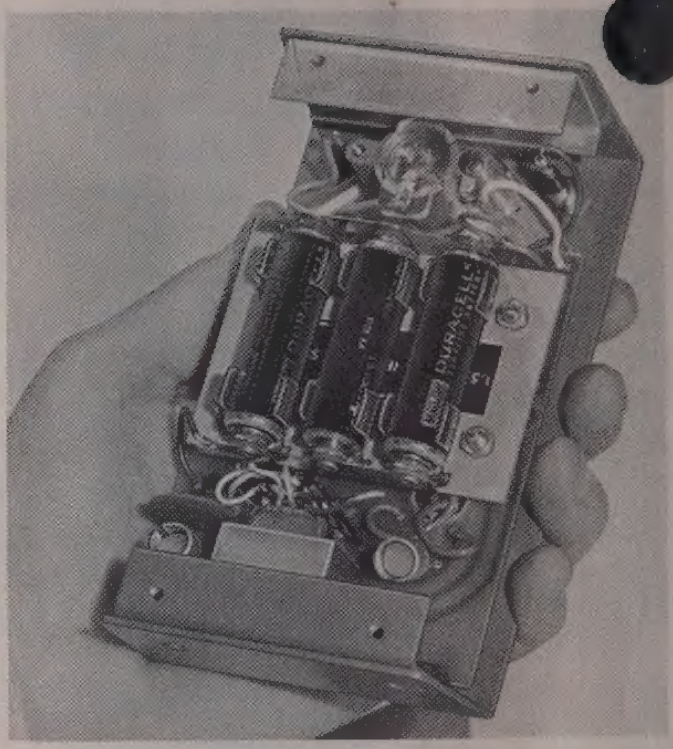
The high voltage across the MEG-CHEK terminals is built up from 4.5 volts supplied by the dry cells in the unit. This is accomplished by changing the battery current to alternating current by means of a transistorized oscillator circuit and applying to the transformer (T_1) which steps it up to a higher value.

The higher AC voltage is then fed to a voltage doubler which rectifies it to DC and filters out the ripple. The resulting direct current is then applied at the measuring terminals through the metering circuit (M_1) and calibration resistor R_4.



MAINTENANCE

To replace batteries remove the four screws from bottom of the case and carefully lift the panel assembly from case. Remove the batteries from battery holder (located on bottom of panel assembly). Replace with type E91 alkaline cells. If alkaline cells are not available regular size AA penlight cells may be used (with consequent shorter life). Observe polarity as indicated on diagram under batteries.



Note: The most common cause of the instrument not working is improper alignment or poor contact of the batteries in the holder.

PARTS AND ACCESSORIES

No. 16223 Leatherette Carrying Case with handle
No. 8435 Insulation Records Cards, Twenty
No. 17451/52 Pair of 5-ft (1.5 m) Test Leads
No. 16149 Set of three Batteries

WARRANTY

MEG-CHEKS are guaranteed to be free from defects in workmanship and material for one year from date of shipment provided the Owners Registration Card is returned within fifteen days from receipt of the unit, and there is no evidence of modifications, tampering, or physical damage.

This guarantee does *not* cover batteries or accessories not of Associated Research manufacture.

Any unit found defective under this guarantee will be repaired free of charge if returned to the factory prepaid and insured.

HER ARI TESTING INSTRUMENTS

Model 45 Phase Sequence Indicator

Positive Indications—
Instant Reading—No Moving Parts

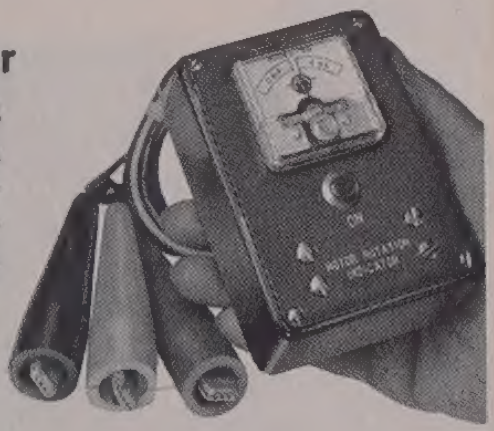
A pocket-size portable instrument that provides positive phase sequence indication when connected to 90-700 volt three phase power sources.

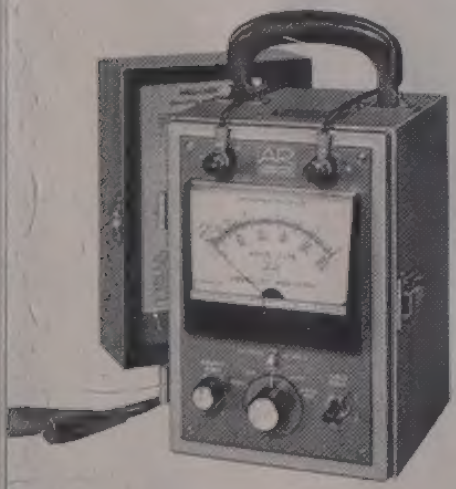
Bulletin 7-1.3

Model 50 Motor Rotation Indicator

A portable pocket-size instrument that provides positive indication of direction of shaft rotation in unmarked multi-phase motors. Guard against costly damage through improper connection of motors.

Write for Bulletin 7-1.3





Measure Resistance to Ten Million Megohms

Fourteen other megohmmeter models available for insulation resistance measurements to ten million megohms and at test potentials to 10 KV DC.

Popular **Model 2201** illustrated at left is a 4-in-1 instrument featuring ranges of 0-200 megohms at 500 VDC, 0-2000 ohms ohmmeter, and 0-150/300/600 V AC and DV voltmeter.

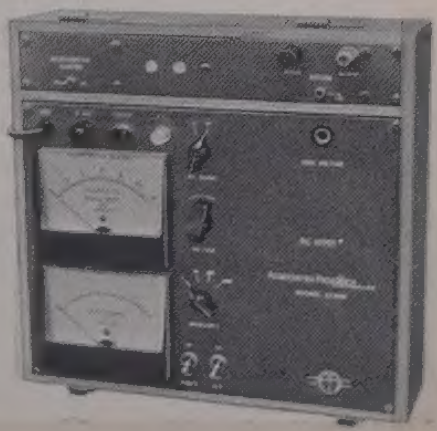
Write for Bulletin Meg-Chek.

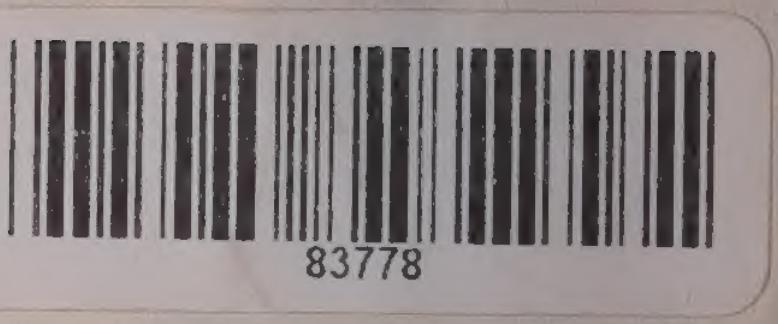
High Voltage DC Cable Testers

For acceptance, proof and maintenance testing of cables, splices and equipment. Cable fault locating equipment also available.

Portable models to 15 KV DC and Mobile models to 200 KV DC.

Write for HV DC Cable Test Manual





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INSTRUMENTS FOR MEASURING:
Insulation resistance... the MEG-CHEK®
Ground resistance—soil resistivity...
the VIBROGROUND®
High Voltage breakdown, AC-DC...
the HYPOT®
Cable Fault location...
the HYJOULE®
Special instrumentation for laboratory,
production, and maintenance needs.

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